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OFFICE OF
AIR AND RADIATION

**Summary of Rationale for Version 2.0 ENERGY STAR® Residential
Ceiling Fan Specification**

I. Introduction and Background

This memorandum provides a summary of the rationale and key changes that appear in the Residential Ceiling Fan Version 2.0 specification. It contains the following information:

- Summary of the Version 2.0 Specification and the key changes from the last specification
- Summary of key milestones in the development of the Version 2.0 Specification
- Summary of comments provided by stakeholders
- EPA's rationale for deciding on key elements of the final Version 2.0 Specification

II. Summary of Version 2.0 Specification

EPA's goal in revising the Version 1.1 residential ceiling fan specification was two-fold: (1) to provide further clarification on existing technical and testing requirements and (2) to ensure that the Tier II requirements and effective date were appropriate. The following key changes were made to the specification:

- Definitions for Light Kit, Standby Mode, and Hugger Fan were revised for clarification purposes and consistency with the ENERGY STAR residential light fixture specification.
- Section 3, Energy Efficiency Specification for Qualifying Products, was renamed "Performance Specification and Lighting Requirements for Qualifying Products" and separated into five new, discrete sections.
- Minimum airflow and efficiency requirements for medium speed were adjusted from 2500 CFM (110 CFM/watt) to 3000 CFM and (100 CFM/watt), effective October 1, 2003, to accommodate performance expectations on the part of the consumer. Under Tier II, manufacturers will no longer be allowed to apply a 5% tolerance to initial test results to meet minimum performance requirements.
- Placeholders for standby mode, power factor, and sound have been removed from the specification until EPA can determine the appropriate testing and performance requirements.

- For fan models that offer more than three speeds, manufacturers will be allowed to choose which speeds to test and qualify as ENERGY STAR.
- The challenge process was expanded to ensure a standard operating procedure when addressing challenges under the specification. The text was revised to be consistent with current ENERGY STAR program procedures.
- The specification makes clear that grandfathering is no longer allowed. EPA requires product models to meet the specification in effect on their manufacture date if they are to carry the ENERGY STAR.
- New Tier 1 and Tier II effective dates were established: October 1, 2003 and October 1, 2004, respectively.

III. Key Milestones of Specification Revision

The final Version 2.0 Specification was developed and finalized over the course of one year, and included the following key milestones:

- An ENERGY STAR ceiling fan partner meeting during the Dallas Market trade show on June 24, 2002, which included a discussion on both Tier I and Tier II requirements.
- Two draft specifications were released for stakeholder comment prior to finalization on September 24, 2003.

Industry meeting notes and presentations, 1st and 2nd draft versions of the specification, and all stakeholder comments were posted, with approval, to the ENERGY STAR Product Development Web page throughout the development process.

IV. Summary of Stakeholder Input

In addition to feedback provided during the partner meeting, EPA received written comments from Hunter Fan Company, Natural Resources Canada, Lowe's Company, and other ENERGY STAR partners who participated in the program under Tier I. The key comments are summarized below, along with EPA's response:

- The specification should include performance requirements for the various ceiling fan sizes available in the marketplace. Applying the current specification, which was based on performance data collected from 52" fan models, to other sizes is not correct. For example, the minimum 5000 CFM high-speed requirement is unnecessary for a 36" fan that will be used in a small room. Realistically a 3700 CFM requirement is good enough for such a fan. Setting a higher CFM requirement (therefore higher watts) for a 36" fan is practically in opposition to the values behind the ENERGY STAR philosophy.

EPA Response: EPA agrees that it is important not only for consumers to find an ENERGY STAR qualified ceiling fan in the marketplace, it is equally important that they find a model suitable for their needs. While the performance requirements do not specify fan size, it is true that the majority of ceiling fans that have qualified to date are 52" models. This is in part because the initial performance requirements were set by EPA based on test data collected from a pool of representative models, most of which were 52" in size. Based on consumer

and market research, EPA has found that 52" fan models comprise a large percentage of the marketplace. Therefore, it is EPA's belief that the specification does provide opportunity to the largest inventory of fans in the marketplace. However, EPA continues to be interested in other fan sizes and would like to work with ceiling fan partners to begin building a database that includes performance data in the following size categories: 24-36", 37-49", 50-59", and 60-68". Based on this data and interest from manufacturers, EPA will determine whether or not separate requirements for different fan sizes are applicable.

- The 5% tolerance should not be completely eliminated from the specification. For initial qualification purposes, all models should be required to meet the minimum requirements without the assistance of a tolerance. However, a 5% tolerance is necessary to account for manufacturing and laboratory testing variables.

EPA Response: EPA agrees with this statement. While the 5% tolerance has been eliminated for qualification purposes, the specification will continue to allow for a 5% tolerance when comparing the performances of a unit found at retail and its representative model listed on the ENERGY STAR qualified product list. This 5% tolerance will only be used to assure product performance in the field and not for initial ENERGY STAR qualification. In the Final Draft, EPA provided the following explanation to clarify this requirement:

"Currently a representative fan model may qualify as ENERGY STAR as long as it performs within 5 percent of the minimum CFM and CFM/watt requirements when tested. Under the new Version 2.0 specification, this 5 percent testing tolerance will be eliminated, effective October 1, 2004. Representative models that test below these levels will not qualify as ENERGY STAR. However, ceiling fan models manufactured and sold based on the representative model design may test within 5 percent of the reported [to EPA] CFM and CFM/watt claims and still qualify as ENERGY STAR."

- Without establishing some maximum acceptable noise requirement, the engineering changes that are made to ceiling fan models to qualify as ENERGY STAR could result in noisy fans and consumer dissatisfaction.

EPA Response: While EPA agrees that noise is an important component of fan quality, there is currently no test standard/procedure that has been specifically developed for ceiling fans. The process of developing a new test procedure will involve the coordination of a number of different parties, draft revisions, and test sessions. EPA continues to be interested in developing such a test procedure but did not want to delay the specification revision to do so. EPA will work with interested parties in the future to determine whether or not a test procedure can be developed and a minimum sound level included in the specification.

- The levels for medium speed provided in Version 1.1 will not meet performance expectations and the consumer may elect to use the higher speed to achieve the desired cooling effect, using more electricity.

EPA Response: EPA and other ceiling fan manufacturers agreed with this suggestion and changed the medium speed minimum airflow requirement from 2,500 CFM to 3,000 CFM. EPA's intention behind this revision was to offer qualified models that provide enough airflow so that the consumer chooses to set the fan on medium speed rather than high speed, using less energy. Following the motor performance curve provided by low and high speeds, this changed the minimum efficiency requirement from 110 CFM/watt to 100 CFM/watt. It is important to EPA that the comfort and quality that consumers have become accustomed to with ceiling fans are not sacrificed for higher efficiency.

- Round-robin testing of the ceiling fan laboratories should be performed annually as opposed to every six months. The calibration testing tolerance is too stringent and difficult to meet.

EPA Response: EPA and the ceiling fan testing laboratories agreed with the first suggestion. Calibration testing once a year is sufficient to determine inconsistencies between test facilities and is more cost-efficient. After further review of the test procedure and annual calibration results, EPA determined that verification testing should be conducted in the same manner as initial qualification testing and be allowed the same 5% variance.

- The specification should use IEC 62301, “Household Electrical Appliances – Measurement of Standby Power” to define a test procedure for measuring standby in both the specification and the Testing Facility Guidance Manual.

EPA Response: At the time the Version 2.0 specification was being developed, IEC 62301 was being revised. While it made sense to use the definition for standby mode provided in this standard, EPA did not want to reference a test protocol that was subject to change before being finalized. EPA continues to be interested in a standby mode requirement under this specification and is following the progress of IEC 62301. Once finalized, EPA will work with ceiling fan manufactures and laboratories to determine the appropriate means to measure standby power in ceiling fans and whether or not a 1-watt requirement is appropriate for this product type.

- EPA needs to provide more direction and clarification regarding the challenge rule and process. Specifically, the following suggestions were made: (1) the manufacturer being challenged should be notified prior to testing the model in question and (2) the model in question should be tested at a laboratory other than the one that initially provided qualification.

EPA Response: EPA agreed with both of these suggestions. Section 8C, Product Performance Review Process, was expanded to provide clear direction regarding the steps EPA will take in handling a challenge. This section also provides discrete steps that EPA will follow when reviewing an ENERGY STAR qualified model that is in question.

V. EPA Rationale for Specification

EPA uses a consistent set of criteria in the development and revision of specifications for ENERGY STAR qualified products. These criteria guide EPA in its decision making and help EPA ensure that the ENERGY STAR will continue to be a trustworthy symbol for consumers to rely upon as they purchase products for the home or business and so that their purchases will deliver substantial environmental protection. These criteria include:

- Significant energy savings and environmental protection potential on a national basis;
- Product performance is maintained or enhanced;
- Qualified products will be cost-effective to the buyer and manufacturer;
- Efficiency can be achieved with several technology options, at least one of which is non-proprietary (i.e., not exclusive to proprietary technology);
- Product differentiation and testing are feasible; and
- Labeling would be effective and recognizable in the market.

Below, EPA addresses the Version 2.0 Specification relative to each of these criteria.

- *Expected Energy Savings and Environmental Benefits.* Eliminating the screw-based lighting option and allowing only pin-based CFL light kits to qualify as ENERGY STAR will ensure the long term energy savings and environmental benefits promised by an ENERGY STAR qualified light kit. The Tier I reverse motor control requirement ensures that the consumer can operate the fan year-round for additional energy savings.
- *Product Performance is Maintained or Enhanced.* EPA continues to believe that the minimum requirements provided in the Version 2.0 specification maintain or enhance product performance for the following reasons:
 - Including a minimum CFM level ensures that the consumer does not sacrifice comfort for energy efficiency;
 - The 30-year minimum warranty requirement provides quality assurance to the customer and requires superior workmanship;
 - A number of low cost design changes exist to increase model efficiency and meet ENERGY STAR levels;
- *Cost-effectiveness.* While the consumer may pay more upfront for ENERGY STAR qualified light kits with pin-based CFLs, the savings achieved by the light kit would cover this initial cost within the first 1-2 years of use. Furthermore, manufacturers were already pursuing the pin-based option because of claims that it was more expensive to include the screw-based CFLs in product packaging and the end result was not favorable to the consumer.
- *Several Technology Options, including some with Non-proprietary Technology.* EPA believes that several options continue to exist for improving the energy performance of ceiling fans and light kits. These options include:
 - Availability of the NEMA-ALA matrix of approved lamp and ballast combinations;
 - Availability of new, more efficient motors and blade designs emerging in the marketplace;
 - Flexibility of design to meet minimum airflow and efficiency requirements.
- *Product Differentiation and Testing Procedure.* The test procedure initially developed for measuring ceiling fan performance continues to be effective. Since inception of the program, two new laboratories were built and approved to test ceiling fans for ENERGY STAR qualification. Furthermore, EPA released a Test Facility Guidance Manual that provides specifications for the test chamber and test procedure. To date, test results from currently qualified models present a wide variety of efficiencies within the ENERGY STAR product category. The specification continues to differentiate energy-efficient products in the marketplace.
 - The range in (CFM/watt) efficiencies for ENERGY STAR qualified models is: 147 to 313 for low speed; 107 to 133 for medium speed; and 75 to 106 at high speed.

- A well-defined test procedure ensures that repeatable results can be generated, objective comparisons can be made between products, and loopholes can be avoided. The test procedure developed for the ENERGY STAR ceiling fan program has been used by industry for more than two years. In 2002, EPA worked closely with three ceiling fan testing facilities to create *The ENERGY STAR Testing Facility Guidance Manual: Building a Testing Facility and Performing the Solid State Test Method for ENERGY STAR Qualified Ceiling Fans*. Ceiling fan test laboratories are now offering price-competitive test packages for customers. Furthermore, a representative model only needs to be tested once to qualify as ENERGY STAR.
 - The testing that is required of pin-based ENERGY STAR qualified light kits could be costly and burdensome to the ceiling fan manufacturer. EPA is addressing these concerns by pre-approving OEM lamp/ballast combinations, making it easier for manufacturers to identify platforms that have already been tested and meet certain ENERGY STAR performance requirements. Ceiling fan manufacturers can partner with these OEMs, incorporate their platform into their light kit design, and submit an EPA Letter of Qualification in lieu of performing some of the testing themselves. **Note:** there are requirements not covered by the Letter of Qualification, which may require additional testing by the ceiling fan manufacturers.
- *Labeling.* EPA believes the ENERGY STAR mark serves an important role in the marketplace due to the absence of any other objective basis for buyers to identify, and manufacturers to promote, highly efficient ceiling fans and light kits. Examples of the impact made to date by ENERGY STAR qualified ceiling fans and light kits are provided below:
- In just under three years, there are more than 100 ceiling fan models, in more than 550 finishes, available in the marketplace and 23 partners participating in the program to date;
 - Ceiling fans and light kits are sold in many different distribution channels, including showrooms, mass retailers, and new construction accounts, which provides a number of opportunities to differentiate ENERGY STAR qualifying models and ultimately sales of these ENERGY STAR qualifying models; and
 - EPA is continuing to receive interest in ENERGY STAR qualified ceiling fans and light kits from manufacturers who want to join as partners and utilities who are looking to provide rebates and promote qualified models. The marketplace is realizing the added value that comes with ENERGY STAR qualified ceiling fans.

VI. Noteworthy Aspects of the Specification

Tier I of the Version 2.0 Specification – effective October 1, 2003

- Revision of Challenge Process: The challenge language was revised to be more consistent with EPA's approach toward other ENERGY STAR product categories. Section 8C now provides the specific steps that EPA will take in addressing manufacturer challenges.
- Revision of Medium Speed Airflow and Efficiency Requirements: To address manufacturer quality concerns and ensure that the most energy-efficient speed is chosen by the consumer, the medium speed CFM was increased to 3,000 CFM and the efficiency requirement adjusted to 100 CFM/watt.

- Elimination of Screw-Based Lighting Option: EPA's intent in allowing screw-based CFLs in ENERGY STAR qualifying light kits was to allow partners time to develop pin-based technologies while addressing energy-efficiency in the near term. Prior to the Tier I effective date, manufacturers were already well on their way to developing pin-based options and were therefore, prepared for the new requirements.
- Requirement to Offer Adjustment of Airflow Direction: All qualifying ceiling fans are required to provide adjustment of airflow direction (upward or downward) by one of the following means: (1) a vertically or horizontally mounted slide switch on the motor housing along with clear direction as to which switch position corresponds with each direction; (2) a wall mounted switch; (3) a remote control; or (4) a readily accessible pull chain.

Tier II of the Version 2.0 Specification – effective October 1, 2004

- Elimination of Initial Testing and Qualification Tolerance: The 5% measurement tolerance for the testing of product airflow and efficiency was eliminated under the Tier II requirement. The tolerance was originally included to allow manufacturers time to redesign models to meet the minimum requirements while ensuring early market penetration of ENERGY STAR qualified models. Models found in the marketplace, and represented by the original tested model's test results, can continue to perform within 5% of the reported levels provided to EPA for qualification and be in compliance.

Date of Manufacture and Elimination of Grandfathering Language

- Under Version 2.0, ENERGY STAR has made a significant change with regard to product qualification and labeling during specification transitions. ENERGY STAR qualification is not automatically granted for the life of the product model. To carry the ENERGY STAR, a product model must meet the ENERGY STAR specification, or Tier, in effect on the model's date of manufacture. The date of manufacture is specific to each unit and is the date (e.g., month and year) of which a unit is considered to be completely assembled.
- Since ENERGY STAR began in 1992, manufacturers have stressed the importance of maintaining a single attribute label where the model either qualifies as ENERGY STAR or it does not. Grandfathering fails to support this vision and is potentially confusing to consumers as it allows models in the marketplace at the same time to be identified as ENERGY STAR under different specifications. Models that meet Tier I of this specification, but do not meet Tier II; must be retested and resubmitted for ENERGY STAR qualification.
- It is not EPA's intention to require product to be pulled from the shelves if it no longer qualifies. These products can continue to be sold through the distribution channel but may not be marketed or promoted as ENERGY STAR qualified.
- ENERGY STAR has decided to discontinue grandfathering across all product categories for the following reasons:
 1. To deliver on expectations about ENERGY STAR by ensuring that the products perform at levels promised.
 2. To ensure that ENERGY STAR's ability to differentiate more efficient products is not undermined by high percentages of labeled products qualifying at less stringent performance levels.